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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A method of real-time estimation of a flow mode, at all points of a pipe whose structure can be defined by ~~a number of structure~~structural parameters, of a multiphase fluid stream defined by physical quantities and comprising at least a liquid phase and at least a gas phase, the method comprising:

forming a non-linear neural network with an input layer having as many inputs as there are ~~structure~~structural parameters and physical quantities, an output layer with as many outputs as there are quantities necessary for estimation of the flow mode and at least one intermediate layer;

creating a learning base with predetermined tables connecting values obtained for the output data to corresponding values of the input data; and

determining by iterations weighting factors of activation function allowing connection of the values in input and output data ~~table~~table.

determining at least a velocity difference between gas and liquid and a stratified flow fraction with the neural network defined by the weighting factor; and

estimating the flow mode from at least the velocity difference and the stratified flow fraction.

2. (Previously Presented) A method as claimed in claim 1, further comprising:

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analyzing the output data of the neural network to allow sorting, among the values of the output data of the neural network, only data to be taken into account in the iterative determination of weighting coefficients of the activation function.

3. (Previously Presented) A method as claimed in claim 1, wherein:
a totally connected network is formed.

4. (Previously Presented) A method as claimed in claim 1, wherein:
output neurons are linear.

5. (Previously Presented) A method as claimed in claim 1, wherein:
the activation function is an identity function.

6. (Currently Amended) A system providing real-time estimation of a flow mode, at all points of a pipe whose structure can be defined by structurestructural parameters, of a multiphase fluid stream defined by physical quantities and comprising at least a liquid phase and at least a gas phase, the system comprising:

means for determining characteristics of a non-linear neural network with an input layer having as many inputs as there are structurestructural parameters and physical quantities, an output layer having as many outputs as there are quantities necessary for estimation of the flow mode and at least one intermediate layer;

means for storing a learning base with predetermined tables connecting values obtained for the output data to corresponding values of the input data; and

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means for determining by iterations weighting factors of an activation function allowing connection of the values in input and output data tablestable.

means for determining at least a velocity difference between gas and liquid and a stratified flow fraction with the neural network defined by the weighting factors:
and

means for estimating the flow mode from at least the velocity difference and the stratified flow fraction.

7. (Previously Presented) A system as claimed in claim 6, comprising:

means for analyzing the output data of the neural network allowing sorting, among the values of the output data of the neural network, only data to be taken into account in the iterative determination of weighting coefficients of the activation function.

8. (Previously Presented) A method as claimed in claim 2, wherein:
a totally connected network is formed.

9. (Previously Presented) A method as claimed in claim 2, wherein:
output neurons are linear.

10. (Previously Presented) A method as claimed in claim 3, wherein:
output neurons are linear.

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11. (Previously Presented) A method as claimed in claim 8, wherein:
output neurons are linear.

12. (Previously Presented) A method as claimed in claim 2, wherein:
the activation function is an identity function.

13. (Previously Presented) A method as claimed in claim 3, wherein:
the activation function is an identity function.

14. (Previously Presented) A method as claimed in claim 8, wherein:
the activation function is an identity function.